UNIVERSITI MALAYSIA SARAWAK

FACULTY OF ENGINEERING

CIVIL ENGINEERING PROGRAMME

Self-Assessment Report

Document submitted to Engineering Accreditation Council

For

Bachelor of Engineering (Civil)

Civil Engineering Department
Faculty of Engineering
Universiti Malaysia Sarawak

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A. Background Information

1.0 Introduction

This document is prepared as a self-assessment report to fulfill Item 8.2 of the EAC manual in the department's effort to get the accreditation for its civil engineering program the moves toward Outcomes-Based approach. The guidelines as stated in Item 8.2 of the EAC manual has been followed in preparing this report and this document should be read together with Appendix C (Checklist of Documents for Accreditation/Approval of New Programme and Relevant Information). Supporting Documents in soft copies are also available for referencing when needed.

2.0 General Information on the IHL and the Programme

University Malaysia Sarawak (UNIMAS) was officially incorporated on 24th December 1992. With about 30 academic staff, the University opened its doors to the first batch of 118 students on 8th August 1993. The students were registered in the two pioneering faculties, the Faculty of Social Science and the Faculty of Resource Science and Technology. Two academic support centre were also established: the Centre for Applied Learning and Multimedia, and the Centre for Academic Information Services.

The following year (1994) another four faculties offering their degree courses: the Faculty of Cognitive Sciences and Human Development, the Faculty of Applied and Creative Arts, the Faculty of Engineering, and the Faculty of Information Technology. Staff and student numbers quadrupled. The Faculty of Engineering which is one of the eight faculties in UNIMAS was formed on 30th December 1993. The faculty started off with only two engineering programmes, namely, Civil Engineering and Electronics and Communications Engineering with the 1st intake in July 1994. The Mechanical Engineering and Manufacturing System Programme was introduced in 1996 and followed by the Electronics and Computer Engineering programme in May 2000.

The Department of Civil Engineering students' first intake was in the year 1994. Since then, the number of students per intake has increased from year to year to the current 120 students per intake. As the current UNIMAS has moved to its new, bigger and permanent place with conducive environment, it is hoped that, this would cultivate a productive learning and research surroundings.

3.0 Degree Titles

The title of the degree is Bachelor of Engineering (Honours) in Civil Engineering.

4.0 Programme Modes

The programme is offered to full time students, enlisted through the process moderated by the Ministry of Higher Education. Typically the programme is offered to students finishing their matriculation studies, STPM and civil engineering diploma holders. The current programme duration is 4 years (8 semesters) where the students will undertake their industrial training for 1 semester in semester 6. Each semester consists of 14 weeks lectures, 1 week mid-semester break, 1 week for revision and 3 weeks for final examination.

The latest programme accreditation was awarded in 2004.EAC accredited the programme for intake from 2000 till 2004. Accreditation for intake 2005 onwards is necessary and thus, this submission of the self-assessment report.

Since the last accreditation, EAC in its effort for the country be able to be accepted as a full signatory member for Washington Accord (WA) has overhaul its manual for accreditation to emphasis the need for an Outcome-Based Education (OBE). In fulfilling the needs of the new accreditation manual, Programme Education Objectives (PEOs) and Programme Outcomes (POs) has been developed by the department. In the process of formulating the PEOs of the Civil Engineering Programme, the department has taking into consideration the vision and mission of UNIMAS and Faculty of Engineering and at the same time the contribution from the stakeholders through the student session meeting, external examiners visit, plenary session and dialogue with the industry. As for POs, the curriculum and course syllabus has been designed and planned according to ABET Criteria 3 where 11 criteria from ABET has been adopted. Since OBE is a continuous process, an OBE committee has been set up not only at departmental level but also at faculty level (Jawatankuasa Jaminan Kualiti Fakulti) to monitor the implementation of OBE and at the same time to educate especially the staff on OBE. Seminars on the awareness of OBE has and also workshop of cooperative learning and strategic course development and assessment has been held and attend by the academic staff so as to exposed them to the element of OBE.

5.0 Action taken from previous Accreditation

The last accreditation for this programme was in 2004. The programme was accredited by the Engineering Accreditation Council (EAC) with some conditions or recommendations. The following are actions taken from the summary of Accreditation Panel Report

I. Academic Programme Basic Requirement

There are some changes that have been made to reduce the credit hours. Laboratory sessions that were embedded in related courses previously, have been taken out. Six civil engineering laboratory courses have been introduced. Each laboratory is given one credit

hour. Tutorials sessions have been categorized either as compulsory or voluntary. Compulsory tutorials require attendance to be taken and the hours spent are included as student workload. Voluntary tutorials session are offered by academic staff to students who need extra assistant in their studies.

II. Evaluation Criterion No.1- Academic Programme

The department also has introduced more engineering software for students. Among the new software bought since the last accreditation in 2004 are AutoCad, Infoworks Aided Engineering packages, Matlab Engineering, etc. (Refer the attached Appendix C, Part H: Criterion 4: Facilities for more detail).

III. Evaluation Criterion No.2- Academic and Support Staff

The faculty has submitted a proposal on professional training scheme for lecturers to the University Management Board. The proposal has been approved on 6th July 2007 and lecturers are encouraged to go for industrial attachment. Please refer to Working Paper for Professional Training Scheme for Lecturers for further information. One of our senior staff, Assoc. Prof. Ir. Dr. Law Puong Ling has successfully taken his Professional Engineer (PE) Examination in May, 2005. Constant encouragement for other staff to pursue their PE examination.

IV. Evaluation Criterion No.3 - Students

A lot of activities have been organised for the students' development. Student association had been set-up for the engineering student (Student Association Faculty of Engineering (SAFE)).

Speaker Corner is also a program that has been set-up by the Faculty of Engineering to help and teach students on public speaking. For more information, please refer to Working Paper for Speaker Corner.

Mentor – Mentee System is a system that has been implemented by UNIMAS to helps students especially in their studies. This system had been implemented at departmental level to monitor the performance of students and helped to strengthen the mentor – mentee relationship. Both parties have to arrange meeting to discuss on the academic performance and other relevant topic.

Ad-hoc programmes were also organized by the Faculty to ensure student developments. Three programme that has been successfully undertaken are:

i) Kursus Kecemerlangan Akademik
ii) Program Mekar Wawasan
iii) HSE Awareness programme

Awards and scholarships are also given to top students. Such as; Zecon Awards and Scholarships, Osaka Gas Scholarships and SAFE Awards.

V. Recommendation by Evaluation Panel

i) *Sasaran Kerja Tahunan* (SKT) had been using as methods of assessment for monitoring and evaluating the staff yearly performance. The evaluation of the staff is more transparent where the Head of Department will have discussion with each lecturer on their yearly achievements and improvement.

At the faculty level, the Dean will inform all lecturer based on the schedule of promotion given by the top management of UNIMAS. Since 2005 to date, eight of the Department Academic Staff have been promoted. They are:

- Professor – 1 staff
- Associate Professor – 2 staff
- Senior Lecturer – 5 staff

ii) Involvement of industrial advisors have been taken up since 2005. Activities held to gain input of people from the industry are :

- Pleanary Session (June 2005) where the curriculum had been presented and discussed with the industry.
- Appointment of Ir. Hj. Zawawi Hj. Embong as Industrial Advisor. He was invited to review the curriculum and become one of the member for Board of Studies
- Board of Studies (BoS) meeting was held on 24 April 2007 where 6 of the representatives from the industry attend the meeting. BoS will assess the curriculum of the programmed and suggest improvement where necessary and also to conduct students' visitation to the industry.

iii) The department has introduced a subject on Integrated Design Project. This subject was introduced into the Civil Engineering Curriculum since 2006/07 session onward. Please refer to Civil Engineering Curriculum Development 2004 – 2009 and Civil Engineering Course Syllabus.

Civil Engineering Department has taken serious actions on the conditions and recommendations given by EAC and changes have been done on the curriculum to ensure that the department can deliver a quality civil engineering education to students.

B. Accreditation Summary

1.0 PROGRAMME EDUCATIONAL OBJECTIVES

The Programme Educational Objectives are broad statements that describe the career and professional accomplishments that the programme is preparing graduates to achieve after several years of graduation.

Since the revision of EAC manual 2005, two important criteria have been introduced, that is Program Educational Objectives and Program Outcomes. These criteria were not part of the existing system and thus have to be developed. Lengthy consultation processes have been done in developing the PEOs and will be explained in the following paragraph.

The Civil Engineering Programme Educational Objectives have been formulated by taking into considerations of both the vision and mission of UNIMAS and the Faculty of Engineering. In developing the PEO, its relationship with the mission statement of UNIMAS was made as the basis for putting up the PEO.

1.1 UNIMAS Vision and Mission

Vision

To become an exemplary university of internationally acknowledged stature and a scholarly institution of choice for both students and academics through the pursuit of excellence in teaching, research and scholarship

Mission

To generate, disseminate and apply knowledge strategically and innovatively to enhance the quality of the nation's culture and prosperity of its people.

1.2 Faculty of Engineering Vision and Mission

Vision

To excel in providing quality engineering programmes through a dynamic and innovative education system, specializing in its niche research areas for the benefits of the nation.

Mission

To provide innovative and systematic engineering education and to produce ethical engineers with good technical and interpersonal skills through the dedication and commitment of faculty members renowned in their respective niche areas, excellent networking and thus, addressing the inspirations of the stakeholders.

1.3 Description of The Programme Educational Objectives

The Programme Educational Objectives are published in the Students' Guidance Book for The Faculty of Engineering and the faculty's website. The graduates who choose to practice civil engineering should gain the following PEOs:

PEO1 Uphold the professionalism, ethics and responsibility of the Civil Engineering profession.

PEO2 Possess a general education and an understanding of the global demand of civil engineering markets and hence able to promote themselves in the international arena.

PEO3 Extend their knowledge by independent learning and continuing education and contribute to the advancement of the profession through involvement in research and development (R&D) activities.

PEO4 Promote multicultural harmony and unity amongst different races and cultures by involvement in the technical or non-technical societies.

1.4 Development of the PEOs

Three key issues are outlined in the mission statement. These are:

1. Exemplary University of internationally acknowledged stature
2. Institution of choice for both students and academics
3. Enhance the quality of the nation's culture and the prosperity of its people.

PEO1 and PEO2 aimed to promote the university worldwide by producing graduates who excel in their practice locally and internationally. The course syllabus should prepare our graduates to take up challenges in the international civil engineering job markets. They are expected to be practicable and employable by international firms and managing projects overseas. This by itself will promote UNIMAS as an institution of choice for students.

At the same time, PEO3 should be able to fulfill the mission of the university to excel in the field of research. This is achieved by promoting academic staff to indulge in various research activities and at the same time transfer the skills to our undergraduates. The outcome will be of two folds: university staff will contribute to the industry through their research activities and our graduates can apply their research skills towards the advancement of the profession.

PEO4 is formulated after taking into account the racial matrix of the people of Sarawak. By considering the cultural scenario of Sarawak, the home base of UNIMAS, having various ethnicity and races, the learning environment should by itself be an avenue to inculcate racial harmony amongst various races. Course curricula should promote inter-racial group's activities and contacts with the people and their interesting cultures inherent in Sarawak. UNIMAS alumni are expected to contribute towards racial unity and play a key role in this aspect.

Our PEOs are developed through review of the University mission statement, evaluation of the desirable characteristics of our graduates, review by faculty members and constituent groups. The entire process of finalizing the PEO should require more time than is available to the department but we managed to get some involvement from the industry constituents. Amongst the constituents that contributed towards the development of our PEO are:

I. External Examiners
II. Input from Industries - Participants from Seminar
- Institute of Engineers Sarawak Branch
- JKR engineers Sarawak
III. Faculty Members
IV. The student session meeting.
V. Parents

I. External Examiners

A study was made on the exit reports by all external examiners who have come to visit the program. Amongst the contributors to these reports were:

- Dr W.H. Craig – Reader in Geotechnical Engineering, School of Engineering, University of Manchester, UK (Aug 1994)
- Prof. Peter Montague – Pro-Vice Chancellor & Professor of Engineering, University of Manchester, UK (October 1996)
- Prof. T.H. Hanna – Consulting Geotechnical Engineer, Sheffield, UK (Oct 1995)
- Assoc. Prof Tan Kiang Hwee – National University Singapore (May 2002)
- Ir Gue See Saw – Geotechnical Consultant, (Dec 2003)

The external examiners have made extensive reviews of our syllabus and quality systems. Amongst the point to note include:

- Increase collaboration with industries in applied researches
- Increase in the number of student doing research projects
- Review of notes and taking inputs from industries
- Formation of toastmaster club to increase communication skills
- Creates code of good practice relating to all aspects of teaching and learning.

By considering the above responses, the department suggested that PEO2 and PEO3 are supposed to embed the ideas in our educational objectives.

II. Input from Industries

i. Participants from Seminar

On 26 March 2005, the department held a seminar to 110 engineers from the stakeholders. Most of them come from the government sector, consultants, contractors, suppliers and other agencies. A questionnaire was distributed to the participants to inquire on the skills most needed by the local industry from our graduates. In one particular section of the questionnaire, it was inquired the kind of skills most required out of the present graduates.
Those skills were divided into 6 categories, namely:

- Construction
- Design
- Management
- Computing
- Communication, and
- Research and Development

The results of the survey are presented graphically in Figure 1.

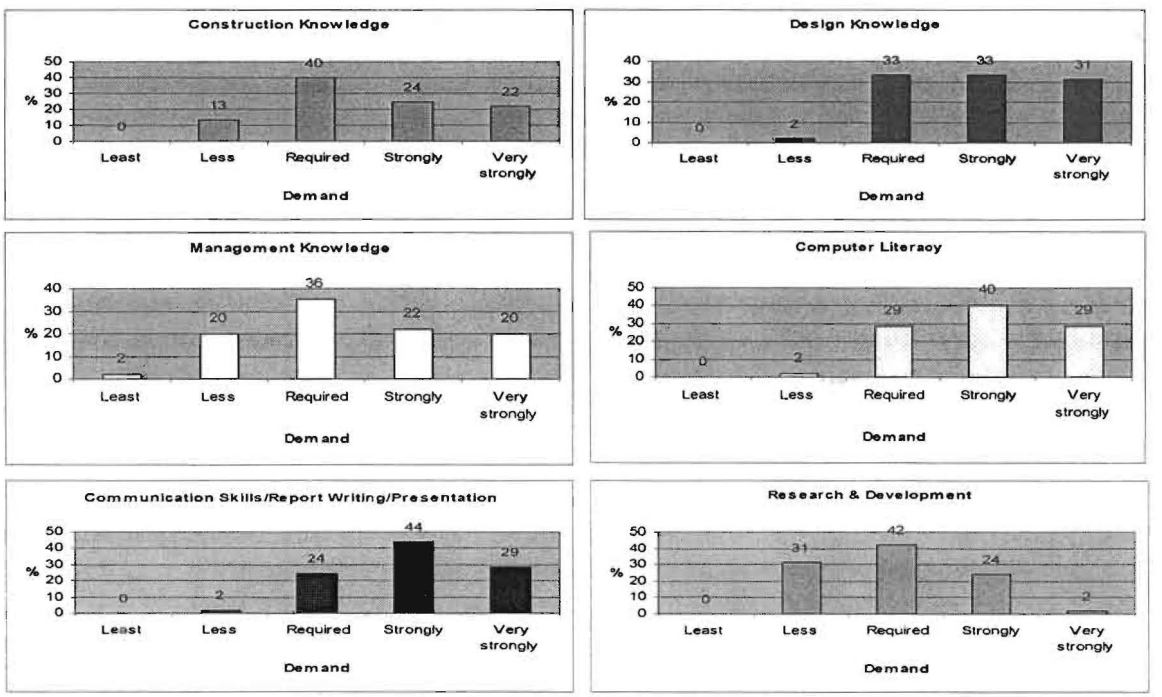

Figure 1.0: Results of survey from engineers in industries

Three categories that received the most recommendation from the respondents were Design, Computing and Communication, whereby more than 60% of them answered

"strongly required" or "very strongly required". By establishing PEO1 and PEO4 our graduates are expected to be able to communicate their ideas and abilities through report and presentations in all occasions. Also, PEO2 would require that our graduates be equipped with the necessary knowledge in design and computing so that they are employable even for international projects.

ii. Dialogue with Institute of Engineers Sarawak Branch (IEMSB) and JKR Headquarters

A meeting with the Chairman of Institute of Engineers Sarawak Branch, Dato Ir Hubert Thian, and his committee members were also held at JKR Headquarters on 28th March 2005. The meeting was originally aimed to hear the views of the IEMSB on the civil engineering program curriculum that our department is reviewing. Coincidentally, Dato Hubert is also the Director of JKR Sarawak and he was able to give his views as both IEMSB Chairman and JKR Director. Similarly, the committee members were all high-ranking officers from Drainage and Irrigation Department and local consultants. The following points were highlighted from IEMSB and JKR.

- The need to establish the project life cycle that takes consideration of local climatic conditions. The importance of establishing a series of publications or textbooks on civil engineering that is relevant to Malaysian culture.The importance of more research on locally available materials for construction and further improvements of the present available standards. Having understood the views expressed by IEMSB and JKR, the department decided to inculcate the importance and ability of doing R&D to our graduates. As such, PEO3 should be a reasonable educational objective of our department.

III. Faculty members

The concept of Outcome Based Education (OBE) was first promoted to all faculty members in the Academic Meeting on 12 March 2005. The significance of adopting OBE in the course curricula was emphasized and the fact that Malaysia is preparing to be a full member of the Washington Accord was explained. This is necessary to promote awareness amongst staff members and keep everyone up-to-date. Among the handouts presented to staff members include the following:

- Reviews and comments from external examiners since 1994
- Publication entitled "Evaluation of Assessment Tools for Outcome

A meeting was recently called on 6 April 2005 to formulate the draft copy of the present PEO and PO.

IV. The student session meeting.

A meeting was called for the department to meet the current student and assess the services offered by the Department to them. It was held on Wednesday, 19 January 2005 in one of the seminar rooms. The meeting was attended by the Head of Department and students from Year 1, Year 2 and Year 4. The students from Year 3 were doing their Industrial training and as such, were not readily available. Amongst the issues raised by the current students include:

- Less exposure to the industries. They suggested more field trips to construction site and other relevant offices.
- Limitation of space and equipment for laboratory sessions.
- Methods of presentation by lecturers

These issues will be taken into consideration when the faculty staffs review their curriculum and course outcomes. PEO1 was developed to embed the input from the students.

V. Parents

An indirect was done in 2006 to evaluate the interest of parents and their expectations. Two parent groups were surveyed and they are:

i) Parents of the graduating students and
ii) Parents of new students

The same set of questionnaire was distributed to all the parents. Amongst issue of interest from parents are:

- To ensure that their children can find a job after graduating
- To become good citizen of Malaysia and contribute to nation building

Beside on the above input, PEO3 and PEO4 should be able to fulfill the parent's needs.

1.5 Ensuring the Achievement of the Programme Educational Objectives

On 12 March 2005, the Outcome Based Education has been introduced to the faculty members of Civil Engineering Department, and since then the OBE approach has been adopted to develop programme that ensure the achievement of Programme Educational Objectives. The curriculum and course syllabus has to be designed to educate students for target outcomes that fulfill a certain criteria related to the programme objectives.

Efforts are being planned and implemented to assess the achievement of the PEO. A new committee on Alumni has been formed at Faculty level to look into this matter.

1.6 Process Evaluation and Achievement of PEOs

1.6.1 Process ensuring the achievement of PEOs

The program curriculum is revised at the end of each academic year based on the views expressed by the stakeholders. The flowchart shown in Figure 2.0 below indicates the process followed for reviewing the curriculum.

(a) Parents and New Students Survey

At the start of the year, survey for the new students and parents are conducted. During the survey, parents and students are asked about expected achievements from the study in UNIMAS. According to their opinion the course curriculum and subsequently programme outcomes are established and reviewed.

(b) Existing Students Survey

Existing students' survey is carried out during both first and second semester. During the survey, students are asked about the extent of their achievements regarding each programme outcome. From their outputs, the course syllabus and programme outcomes are reviewed.

(c) Parents and Graduate Students Survey

Parents and graduate students survey is conducted during convocation. Again graduates are asked about their degree of attainment of programme outcomes during their study. Parents are asked about the quality that their sons/daughters have gained from UNIMAS. Depending upon their outputs the course syllabus and programme outcomes are reviewed.

(d) Teaching Evaluation

Teaching evaluation by the students is carried out at the end of each semester. During the evaluation, students give their opinion regarding the course content and lecturers' performance during that course. According to their opinion, course content is reviewed and lecturers change their style of teaching that helps students achieving course outcomes next time the lecturer teach that course.

(e) Existing Industry Survey

Existing industry survey is carried out during third year students industrial training. During the survey, industrialists are asked about students performance during the training. The visiting supervisor (one lecturer from the faculty who visit student once during the training) also indicates student performance in their report. From their outputs, the course curriculum and subsequently the programme outcomes are changed.

(e) Repetition

Existing students survey and teaching evaluation conducted in semester one are also carried out in semester two in order to obtain the same outputs mention in those two sub-sections.

(f) Plenary Session with Stakeholders

Plenary session with the stakeholders is normally carried out at the end of each year. During the meeting, all information regarding the course curriculum and programme outcomes are passed to them. Survey for the stakeholders is also done during the plenary session. During this survey, the stakeholders are asked about the performance of civil graduates working in their companies. They are also asked to give their opinion regarding the programme outcomes and course curriculum. From their output, programme outcomes and course curriculum are reviewed.

Beside this, *Alumni Survey* is also conducted in each year to evaluate how well the program is meeting the educational and career needs of students.

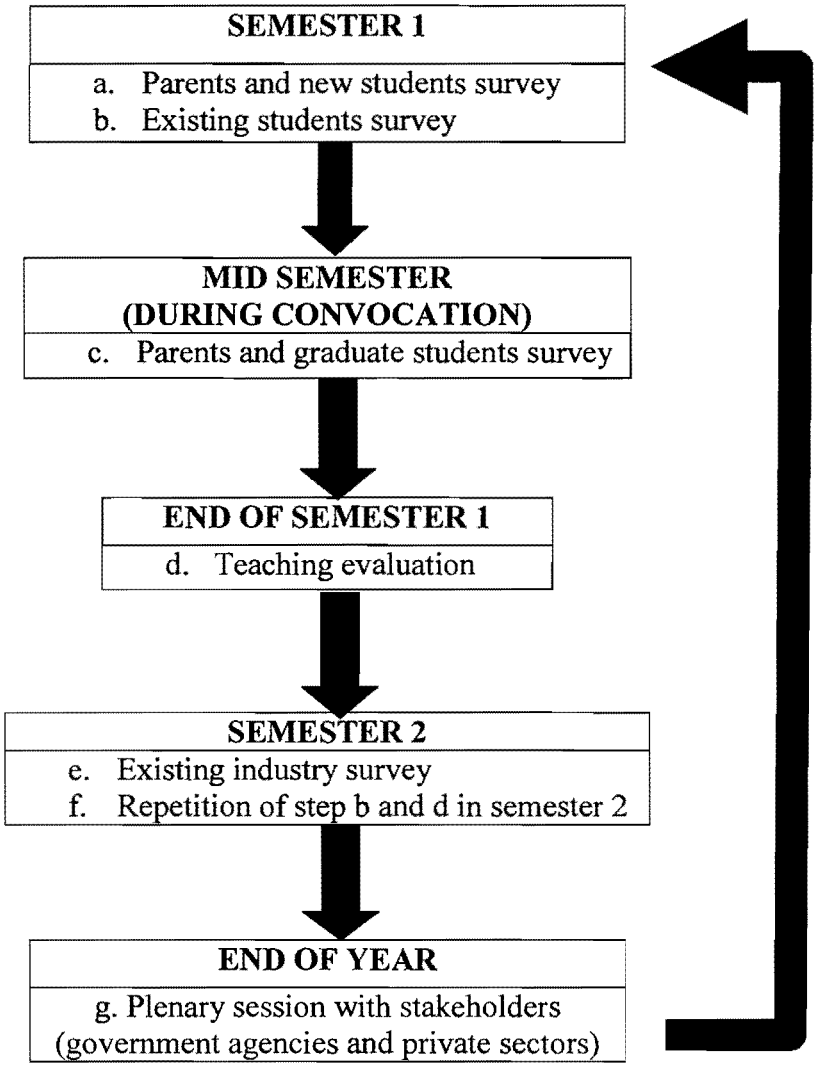

Figure 2.0: Flow chart of programme outcome improvement cycles used for continuous process improvement.

1.6.2 Evaluation and achievement of PEO's

The Evaluation and achievement of PEO's are ensure through a direct process involving surveys as mentioned before in section 1.6.1. The qualitative and quantitative data from these instruments is analyzed to develop recommendations and action items in our *continuous improvement process.*

The department of Civil Engineering so far has carried out alumni survey, parents' survey, exit survey, industry survey, students' survey and teaching evaluation survey of academic staff. However, the first industrial survey is still in the initial stage and will be carried out soon.

The results of the surveys mentioned above have been analyzed and used to evaluate the achievement of the PEO's.

The following section illustrates the summary of the above mentioned process. The details of these surveys data and results of analysis are given in Appendix C.

(a) Alumni survey

Alumni survey was conducted in the year of 2007 to evaluate the departmental programme objectives. The programme educational objectives dealing with the professionalism, ethics and responsibilities (PEO1) and independent learning, advancement of the profession (PEO3) were rated highly by the respondent's alumni. Of the attributes rated lower, the department decided that we needed to focus on PEO2, dealing with global demand and PEO4, dealing with the communication skills of our graduates and the continuous improvement of the overall curriculum in terms of all outcomes.

(b) Parents survey

In the parents' survey which was conducted during students' registration in 2006, the results show that 80 to 100 percent of respondents agree that the department is able to achieve its programme educational objectives. Additional questions were also given to gather the opinions of the respondents based on their expectations for their children getting hired after graduation. Almost all respondents strongly agree on all queries especially expectations on having their children to be able to find jobs after graduation and to become a respectful and honorable citizen. However, between 20 to 40 percent of respondents moderately agree that their children are able to start own engineering business and be prospective even in the oversea market. Some additional comments were also made by parents. Some of the suggestions are to be able to consolidate the knowledge and skills attained' and be able to effectively apply them in a real industrial environment and conversant with the present and latest technologies.

(c) Student survey

In the students' survey during the convocation of 2006, 17 areas concerning skills gained during their studies in UNIMAS are presented. These areas are also the main skills included in the PO and subsequently in the PEO. More than 70 percent of respondents agree that all the skills mentioned in the survey are gained during their studies. The specific PEOs of the department are also presented and almost all respondents rated GOOD on the objectives.

(d) Teaching Evaluation of academic staff

Teaching evaluation is performed every semester and in this manual teaching evaluation for Semester 2, Session 2005/2006, is presented for analysis. Detail data presentation is attached in the appendix. In the evaluation form, queries on the skills of the lecturers were presented; whose skills are important in the attainment of PO and PEO of the department. More than 60 percent of lecturers were rated as EXCELLENT in their teachings, 30 percent were VERY GOOD and the remaining 6 percent and 3 percent of the lecturers were rated VERY EXCELLENT and MODERATE, respectively.

1.7 Improving the Effectiveness of Programme Objectives

Tremendous effort has been taken to translate the result of every single survey and evaluation data to increase the effectiveness of the programme objectives. All survey forms that have been collected will be processed and analysed by the faculty OBE committee and results are then submitted to the dean and head of department for that particular programme. Dean and HoD will take further actions on delivering the information to the members of the faculty through discussions and meetings.

Teaching evaluation form will be handed to another committee called teaching evaluation committee under faculty examination unit. Results from the teaching evaluation are translated into formal letters to be given out to each lecturer stating the result of the evaluations.

The department is improving the process cycle of reviewing survey and evaluation results from time to time. As result, Continuous Quality Improvement cycle has been introduced to provide clear guidelines to be followed by all lecturers. Present here is the COI cycle implemented by the department and department is keen to improve COI cycle for future benefits of the department.

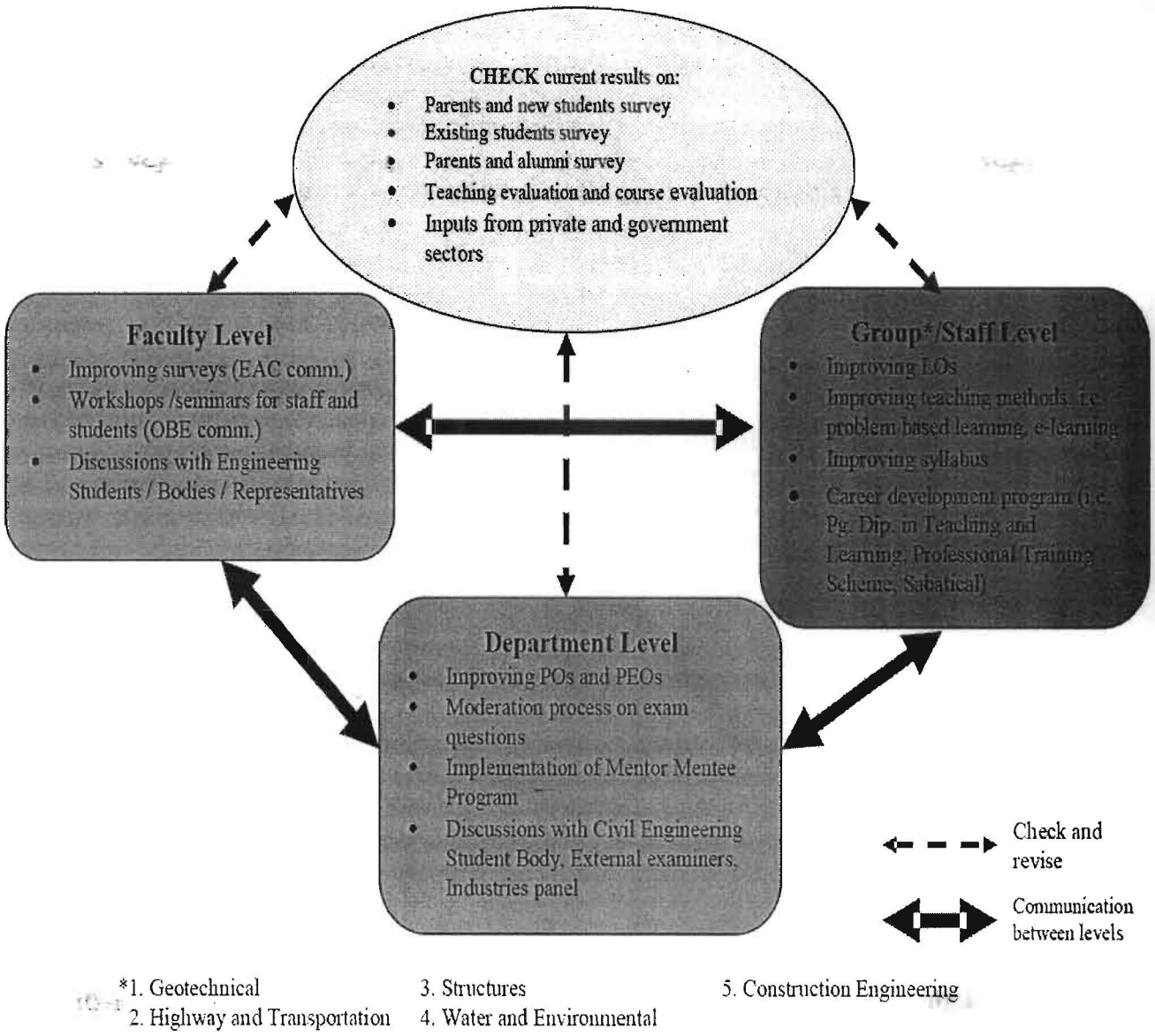

Figure 2.1: Continuous Quality Improvement Cycle: establishment of Improvement cycles to monitor and ensure CQI (i.e. on implementation OBE)

2.0 PROGRAMME OUTCOMES

2.1 List of Programme Outcomes for Civil Engineering Programme

The Program outcomes that have been designed to fulfill the EAC and ABET Criteria 3 for students of Civil Engineering Department as follows:

a) Ability to acquire and apply knowledge of mathematics and sciences related to civil engineering fundamental.
b) Acquire in-depth technical competence in Civil Engineering discipline.
c) Ability to identify, formulate and solve civil engineering problems.
d) Ability to utilize systems approach to design and evaluate operational performance.
e) Understanding of the principles of sustainable development for civil engineering design.
f) Understanding and committed to the professional and ethical responsibilities.
g) Ability to communicate effectively with engineers and community at large.
h) Ability to function effectively as a member or a team leader in a group.
i) Understanding of social, cultural, global and environmental responsibilities of a professional engineer.
j) Recognizing the need to undertake life-long learning for individual capacity development.
k) Ability to use the techniques, skills and modern engineering tools necessary for Civil Engineering practice.

2.2 Relationship between Programme Outcomes (POs) with the Programme Educational Objectives (PEOs)

The Programme Outcomes (POs) of the department mentioned above are attributes and knowledge of the graduates by the time of graduation. In developing the POs, the Programme Objectives (PEOs) of the Civil Engineering Department were made as the basis of formulation. Each POs can be linked and adopted to several PEOs; hence showing the comprehensiveness of the POs to fulfil the department PEOs. PEO1 is linked to all of the POs as it encompasses the general basic attributes that any professional engineer should have.

Figure 2.1, Figure 2.2 and Figure 2.3 indicate how the PEOs and the POs of the Civil Engineering Department, UNIMAS are linked together.

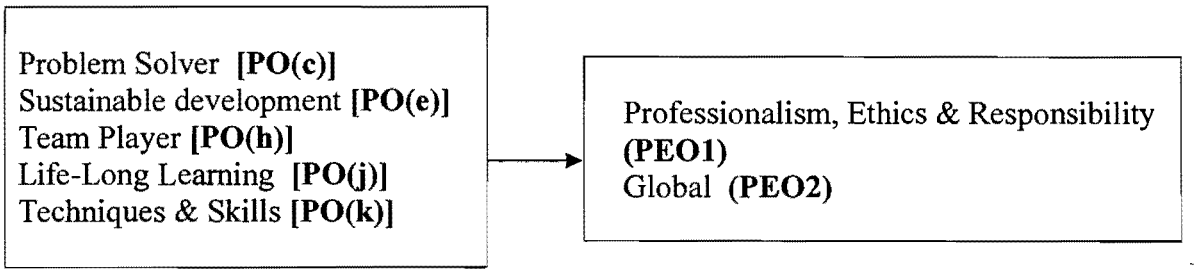

Figure 2.1: The linkage between POs (c,e,h,j,k) to PEO1 and PEO2

PEO1 and PEO2 aimed to promote the university worldwide by producing graduates who excel in their practice locally and internationally. The course syllabus would prepare our graduates to take up these challenges professionally through the department's programme outcomes. The graduates are expected to be practical, able to manipulate different design and operational performance and knowledgeable to principles of sustainable design/development as in PO (c), (e), (h), (j) and (k).

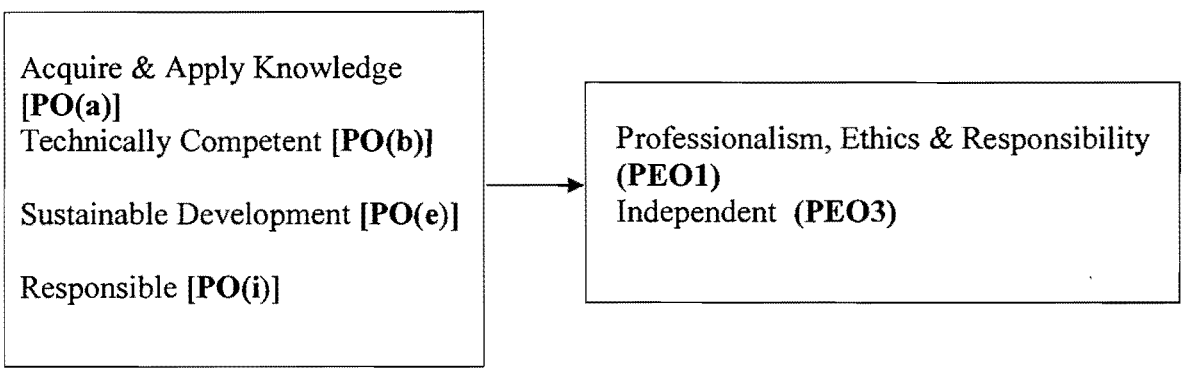

Figure 2.2: The linkage between POs (a,b,e,i) to PEO1 and PEO3

PEO1 and PEO3 should be able to fulfill the mission of the university to excel in the field of research and professionalism. This is achieved by promoting academic staff to indulge in various research activities and university-industry collaborations; at the same time, transfer the skills to our undergraduates. The programme outcomes in PO (a), (b), (e) and (i) will produce graduates with abilities to identify, retrieve and apply knowledge of science and engineering basics, formulate, solve problems as well as to engage themselves in life long learning. Research findings can contribute and benefit the society, industry and country.

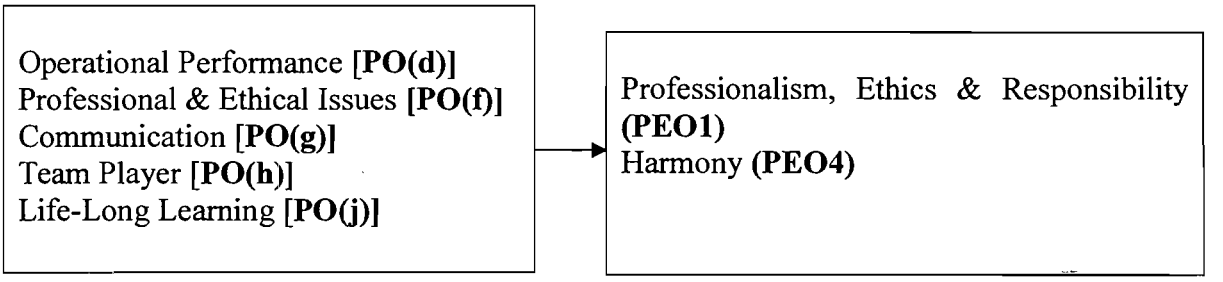

Figure 2.3: The linkage between POs (d,f,g,h,j) to PEO1 and PEO4

PEO1 and PEO4 are formulated after taking into account the racial matrix of the people of Malaysia, in general and Sarawak, in particular. Course curricula developed would promote inter-racial activities and contacts with the different levels of people. Attributes in PO (d), (f) and (g) such as effective communication, good leadership, functioning individually or in teams as well as the understanding of professional, ethical, societal and environmental responsibilities of an engineer are emphasized. UNIMAS alumni having these attributes are expected to contribute towards racial unity and sustainable development.

2.3 Describe how the Programme Outcomes encompasses and relate to the outcome requirements of Section 4.0 of this manual

In section 4.0 of this manual, it is stated that for an Engineering Programme seeking accreditation, it must have the following requirements:

i. The programme shall have published Programme Outcomes formulated considering the ABET Criteria 3 or any added outcomes that can contribute to the achievement of Programme Outcomes.
ii. In designing the curriculum, the programme shall consider the various Programme Outcomes.
iii. There should be a process of measuring, assessing and evaluating the degree of achievement of the Programme Outcomes of the student and also this process should be applied for continuous improvement of the programme.

To achieve requirement (ii), the department has adopted an outcome based system approach. In this approach, learning outcomes matrix has been developed for all the curriculums/subjects involved in the programme. In the learning outcomes matrix, in order to consider the various Programme Outcomes, a relationship between the Course Outcomes (CO) and the Programme Outcomes (PO) has been established with 1 means CO address PO little emphasis, 2 means moderate emphasis and 3 means strong emphasis. The method of delivery and assessment is also mentioned in the learning outcomes matrix. An example of part of a learning outcomes matrix is as shown in Table 1.